



Date Posted: Monday, September 13, 2021

REQUEST FOR PROPOSALS (RFP)

Advancement of Densification to Implement and Achieve More Efficient BNR Processes: Granule Generation, Retention, and Management (RFP 5130)

Due Date: Proposals must be received by **3:00 pm Mountain Time** on **Tuesday, November 9, 2021**

WRF Project Contact: Stephanie Fevig, PE, sfevig@waterrf.org

Project Sponsors

This project is funded by The Water Research Foundation (WRF) as part of WRF's Research Priority Program.

Project Objectives

- Provide WRF subscribers with current knowledge on design and operation of pilot- and full-scale densified systems.
- Address research gaps in granule generation, retention, and management to achieve improved biological nutrient removal (BNR) in full-scale applications.

Budget

Applicants may request up to \$200,000 in WRF funds for this project. WRF funds requested and total project value are evaluation criteria considered in the proposal selection process.

Background and Project Rationale

The advisory committee for WRF's Nutrients Treatment: Intensification, Reliability, and Efficiency Research Area held a [Virtual Research Summit](#) in the Spring of 2021 with WRF subscribers, including utilities, consultants, and academics, to identify key research needs and develop project concepts for potential WRF funding. This project is one of the high-priority project concepts identified to advance full-scale applications through the Nutrients Treatment Research Area.

Densification is a general term used to describe intensification of the biological process to improve sludge settling and ultimately increase secondary treatment capacity. In terms of nutrient removal, encouraging densification and the formation of granules (biological particles that can be in excess of 2mm as compared to generally <100 microns for floc) has shown great promise. For example, recent studies have shown that granule-based systems are capable of achieving nitrification with significantly lower aeration requirements than floc systems. Additionally, granule systems have shown improved denitrification and biological phosphorus removal. A continuous-flow aerobic granular sludge (AGS) process has the potential to achieve stable and reliable BNR, resulting in aeration energy savings within

a smaller footprint, along with achieving improved settleability and higher solids loading rates, resulting in increased secondary clarifier capacity.

This research study will address key issues around generation, retention, and management of granules, with a focus on full-scale continuous flow systems that pave the way for reliable and resilient BNR applications. Desired outcomes include building a knowledge base around known issues and identifying creative and reliable ways for generating, retaining, and managing granules in continuous flow systems.

Research Approach

State of Knowledge

The first component of the project will be to prepare a State of Knowledge document on densification. This should be an international review building upon research to date (see the References and Resources section below), considering batch and continuous flow systems at demonstration and full-scale. The document should include an exhaustive list of technology installation sites and data sources.

Addressing Research Gaps

Proposers will be required to identify, prioritize, and detail key research needs/gaps that they will address under this project for full-scale demonstration. A number of research needs/gaps were gathered from the Virtual Research Summit for consideration (see the References and Resources section below). Proposers should clearly state and justify the research gaps they plan to address for advancing this research topic.

Proposers must also identify participating utilities and provide details on the technology installation and other pilot/lab-scale details.

Expected Deliverables

This RFP is open to creative deliverable products. Potential deliverables include:

- State of Knowledge document
- Guidance for utilities to model, design for, and operate a densified process to achieve nitrogen and/or phosphorus removal based on findings from full-scale or long-term pilot-scale demonstration.

Communication Plan

Please review WRF's *Project Deliverable Guidelines* for information on preparing a communication plan. The guidelines are available at <https://www.waterrf.org/project-report-guidelines>. Conference presentations, webcasts, peer review publication submissions, and other forms of project information dissemination are typically encouraged.

Project Duration

The anticipated period of performance for this project is 24 months from the contract start date.

References and Resources

The following list includes examples of research reports, tools, and other resources that may be helpful to proposers. It is not intended to be comprehensive, nor is it a required list for consideration.

- [Balancing Flocs and Granules for Activated Sludge Process Intensification in Plug Flow Configurations \(4870\)](#)
- [Aerobic Granular Sludge for Biological Nutrient Removal: White Paper \(1533\)](#)

- [Bioaugmentation of Activated Sludge with High Activity Nitrifying Granules/Flocs: Population Selection, Survival, Biokinetics \(4864\) \[In progress\]](#)
 - WRF Nutrients Treatment Research Area [Virtual Research Summit](#), including:
 - Agenda, Polling, and Project Concepts
 - Summit Topic 1
-

Proposal Evaluation Criteria

The following criteria will be used to evaluate proposals:

- Understanding the Problem and Responsiveness to RFP (maximum 20 points)
- Technical and Scientific Merit (maximum 30 points)
- Qualifications, Capabilities, and Management (maximum 20 points)
- Communication Plan, Deliverables, and Applicability (maximum 15 points)
- Budget and Schedule (maximum 15 points)

Proposal Preparation Instructions

Proposals submitted in response to this RFP must be prepared in accordance with the WRF document *Guidelines for Research Priority Program Proposals*. The current version of these guidelines is available at <https://www.waterrf.org/proposal-guidelines>, along with *Instructions for Budget Preparation*. The guidelines contain instructions for the technical aspects, financial statements, indirect costs, and administrative requirements that the applicant must follow when preparing a proposal.

Proposals that include the production of web- or software-based tools, such as websites, Excel spreadsheets, Access databases, etc., must follow the criteria outlined for web tools presented in the Web Tool Criteria and Feasibility Study for The Water Research Foundation Project Deliverables at <https://www.waterrf.org/sites/default/files/file/2021-07/WebToolCriteria.pdf>.

Eligibility to Submit Proposals

Proposals will be accepted from domestic or international entities, including educational institutions, research organizations, governmental agencies, and consultants or other for-profit entities.

WRF's Board of Directors has established a Timeliness Policy that addresses researcher adherence to the project schedule. The policy can be reviewed at <https://www.waterrf.org/policies>. Researchers who are late on any ongoing WRF-sponsored studies without approved no-cost extensions are not eligible to be named participants in any proposals. Direct any questions about eligibility to the WRF project contact listed at the top of this RFP.

Administrative, Cost, and Audit Standards

WRF's research program standards for administrative, cost, and audit compliance are based upon, and comply with, Office of Management and Budget (OMB) Uniform Grants Guidance (UGG), 2 CFR Part 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, and 48 CFR 31.2 Contracts with Commercial Organizations. These standards are referenced in WRF's *Guidelines for Research Priority Program Proposals*, and include specific guidelines outlining the requirements for indirect cost negotiation agreements, financial statements, and the Statement of Direct Labor, Fringe Benefits, and General Overhead. Inclusion of indirect costs must be substantiated by a negotiated agreement or appropriate Statement of Direct Labor, Fringe Benefits, and General Overhead. Well in advance of preparing the proposal, your research and financial staff should review the

detailed instructions included in WRF's *Guidelines for Research Priority Program Proposals* and consult the *Instructions for Budget Preparation*, both available at <https://www.waterrf.org/proposal-guidelines>.

Budget and Funding Information

The maximum funding available from WRF for this project is \$200,000. The applicant must contribute additional resources equivalent to at least 33 percent of the project award. For example, if an applicant requests \$100,000 from WRF, an additional \$33,000 or more must be contributed by the applicant. Acceptable forms of applicant contribution include cost-share, applicant in-kind, or third-party in-kind that comply with 2 CFR Part 200.306 cost sharing or matching. The applicant may elect to contribute more than 33 percent to the project, but the maximum WRF funding available remains fixed at \$200,000. **Proposals that do not meet the minimum 33 percent of the project award will not be accepted.** Consult the *Instructions for Budget Preparation* available at <https://www.waterrf.org/proposal-guidelines> for more information and definitions of terms.

Period of Performance

It is WRF's policy to negotiate a reasonable schedule for each research project. Once this schedule is established, WRF and its sub-recipients have a contractual obligation to adhere to the agreed-upon schedule. Under WRF's No-Cost Extension Policy, a project schedule cannot be extended more than nine months beyond the original contracted schedule, regardless of the number of extensions granted. The policy can be reviewed at <https://www.waterrf.org/policies>.

Utility and Organization Participation

WRF encourages participation from water utilities and other organizations in WRF research. Participation can occur in a variety of ways, including direct participation, in-kind contributions, or in-kind services. To facilitate their participation, WRF has provided contact information, on the last page of this RFP, of utilities and other organizations that have indicated an interest in this research. Proposers are responsible for negotiating utility and organization participation in their particular proposals. The listed utilities and organizations are under no obligation to participate, and the proposer is not obligated to include them in their particular proposal.

Application Procedure and Deadline

Proposals are accepted exclusively online in PDF format, and they must be fully submitted before 3:00 pm Mountain Time on Tuesday, November 9, 2021.

The online proposal system allows submission of your documents until the date and time stated in this RFP. Submit your proposal at <https://forms.waterrf.org/212023818426854>

Please ensure you upload the required documents before the deadline. **Proposals submitted after the deadline will not be accepted.**

Questions to clarify the intent of this RFP and WRF's administrative, cost, and financial requirements may be addressed to the WRF project contact, Stephanie Fevig at (303) 347-6103 or sfevig@waterrf.org. Questions related to proposal submittal through the online system may be addressed to Caroline Bruck at (303) 347-6118 or cbruck@waterrf.org.

Utility and Organization Participants

The following utilities have indicated an interest in possible participation in this research. This information is updated within 24 business hours after a utility or an interested organization submits a volunteer form, and this RFP will be re-posted with the new information. **(Depending upon your settings, you may need to click refresh on your browser to load the latest file.)**

Donald Gray

Sr. Civil Engineer
East Bay Municipal Utility District
2020 Wake Ave
Oakland, CA 94607
USA
(510) 287-1602
donald.gray@ebmud.com

Carlos Vargas, PhD, PE

Senior Planning Engineer
City of Calgary Water Resources
625 25 Avenue SE
Calgary AB T2G 4K8
CANADA
(403) 268-4498
carlos.vargas@calgary.ca

Marie Taponat

Senior Project Engineer, Collaborative
Innovations
Metro Vancouver
4730 Kingsway-Metro Tower III
Burnaby BC V5H 0C6
CANADA
(604) 451-6156
Marie.taponat@metrovancover.org